

G. R. S. IX-5]

Previous references.

File No 186

Serial Nos

1929-20.

(Epu)

Later references.

"Preserved"

~~Preserved~~

GENERAL AND REVENUE SECRETARIAT

Serial Nos.

Fourteen and

Part B for July 1920.

SUBJECT.

Invention for improvements in and
Translating some variations by Hall
tion of Woodwork Building, New York

2246) To, The Director of Dist & Com. Ce
" Secy to the Board for Chem
" Chief Engineer
No 1317-4 of 4.7.20.
For record and copy of
of an invention registered in 18

2246
1/18

1/18

30/19

16/11/19

G. R. S. III-1]

1919-20

GENERAL AND REVENUE SECRETARIAT.

(g.m.)

NOTES.

File No. 186-19

FILE HEADING.

Invention for "Improvements in and relating to trans-
sound variations" by ~~H.~~ Hall Research Corporation, of Woodward
building, New York City, U.S.A.

From

Messrs. H. V. Williams & Co., Calcutta

Letter No. 5151-C

Dated 20. 3. 1920

Received 23. 3. 1920.

Diary No. 6416

Enclos. 3 Spare Copies.

Serial No. /

BRIEF ABSTRACT OF LETTER.

Forward an application on behalf of the Corporation referred to above,
together with a Power of Attorney authorising them to act on their
behalf and a deed of Assignment in favour of the applicant Corporation,
and advise remittance of Rs 19/ and request leave to file a specifi-
cation of the above invention

NOTES AND ORDERS.

The money has been received (Vide cash section's certificate).
The invention has been assigned to the applicant Corpora-
tion for a consideration of £ 50 by the inventor Mr. Raymond
Hall, Engineer of Chicago, U.S.A.

The G.R.R. is put up, duly entered. Submitted with 2 drafts.

27/3/20
27/3/20

lily

Issue

27/3/20

NOTES—First Sheet.

G. M. File No. 186

of 1919.

17322
16466

21

Serial
No.

2

To the Secretary to the Board for chemical
~~research~~ and industrial research and scientific advice
no. G. 22738, dated 3.4.1920.
Forwards for the opinion of the Board the
application referred to in cl. 1 above.

3.

To the Superintendent of Stamps.

no. G. 22739 dated 3.4.1920.

Forwards the Power of Attorney and the deed
of assignment referred to in cl. 1 for being im-
pressed with the Mysore Stamp of the value of
Rs 1 & Rs 8/- respectively, also therewith forwarded.

4

Treasury acknowledgment receipt dated 29.3.1920.
Acknowledges the receipt of Rs 10/- referred to in cl. 1.

5

From the Superintendent of Stamps.

Letter no. 373 dated 5.4.1920.

Forwards the power of attorney and the deed
of assignment referred to in cl. 3 duly stamped
and requests an acknowledgment.

A draft acknowledging is put up for approval.

6

^{30.}
10.4.20. lily

To the same officer

Issue

20
10/4/20

G. 23644 & 14.4.20

Acknowledges the power of attorney
refd. to in cl. 5

General and Revenue
Secretariat.

G.M. File No. 186 of 1919.

Serial
No.

From

7

The Secretary to the Board for Chemical and
Industrial Research and Scientific Advice.

Letter No. 163 dated 6.5.1920.

States with refce. to d.2 that the applicant
may be authorised to file a specification of his
invention and returns the application forwarded
for the opinion of the Board.

Submitted with the usual drafts.

M.A.
14.5.20.

Uly

2nd Member)

For approval

Dec
14/5/20.7036-244
15-5-1920.

Drafts approved

Reel
16.5.20

Issue

Dec
18/5/20.

8 To Messrs. H.V. Williams & Co.

S. 25300 of 29.5.20.

Authorises the filing of the
specification of the invention
reft: to in sl 1

9 To Messrs H.V. Williams & Co

S. 26301 of 29.5.20

Forwards a copy of sl 8 (fo.) for
being sent to the party concerned.

Sms.)

G.M. File No. 186

of 1919.

474

G. 1315

4

Serial
No.

10

From

Messrs H. V. Williams and Co, Calcutta
Letter no 5151-c of 5.7.1920.

Forwards 4 copies of the specification together
with the fees (Rs 30/-) and requests that the
same may be filed.

The money has been received in full. Submitted
with the Treasury Remittance Register duly entered and
the usual drafts. The G.O.S. ~~registrar~~ ^{has} ~~separate~~ have been
signed to issue the necessary certificate.

10.7.20 *uh*
12

Issue
20.7.20
12/7/20.

11. From The Treasury officer.

Tr. No. 269 dated 20th July 1920
Acknowledges the receipt of Rs 30/- ^{for specification of an invention} referred to
in Serial 10. —

12. To, the Compiler, Mysore Gazette.

G. 1315 Dt. 19/7/20.

Notifies the filing of a specification of an
invention for "improvements in and relating to
translating sound vibrations." by Hall Research
Corporation a Delaware Corporation of Woodworth Building
New York city, United States of America —

Gm File No. 186. of 1919.

Serial
No.

13.

To, Messrs H.V. Williams & Co
Patent & Trade Mark of Attorneys.
8. (Esplanade E.) Calcutta
G. 1316(2) dt. 19/7/20.

Forwards a copy of the notification No. G. 1316.
in regard to the invention etc referred to in serial
12.

14.

To, The Director of Industries & Commerce
" Secretary to the Board for Chemical &
Industrial Research & Scientific Advice.
" Chief Engineer
G. 1317-19 dt. 19/7/20.

Forwards, for record, a copy of a Specification
of an invention referred to in serial 12.

B
2897

No. 5151-C.

16416

186-19-1

From.

Messrs. H. V. Williams & Co.,
Patent Agents & Engineers,
8 Esplanade East,
Calcutta.

25538

To.

The Secretary to the Government of,
H. H. the Maharajah of Mysore,
General and Revenue Secretariate,
Bangalore.

Dated the 20th day of March, 1920.

Sir,

Enclosed herewith we have the honour to forward on behalf of Hall Research Corporation, an application under the Inventions and Designs Regulation, 1894, for leave to file a specification in respect of an invention for "Improvements in and relating to Translating Sound Variations".

The documents sent comprise:- A Power of Attorney in our favour, ~~and~~ an Assignment, and the Application with a description of the invention and Drawings.

A Patent for this invention in British India has been applied for, particulars of which are set out in the Application.

A Postal Money Order for Rs 19/- is being sent by same mail, of which Rs 10/- is the fee payable on the application, Stamp Duty of one rupee on the Power of Attorney and a Stamp duty of Rs 8/- on the Assignment.

We have the honour to be,

Sir,

Your most obedient servants,

REGISTERED
ENCLOSURES

H. V. Williams & Co.

md
23/3/20
CHIEF SECRETARY
IV
MINOR PENTS.
73 MAR 1920
m. m. m.

APPLICATION

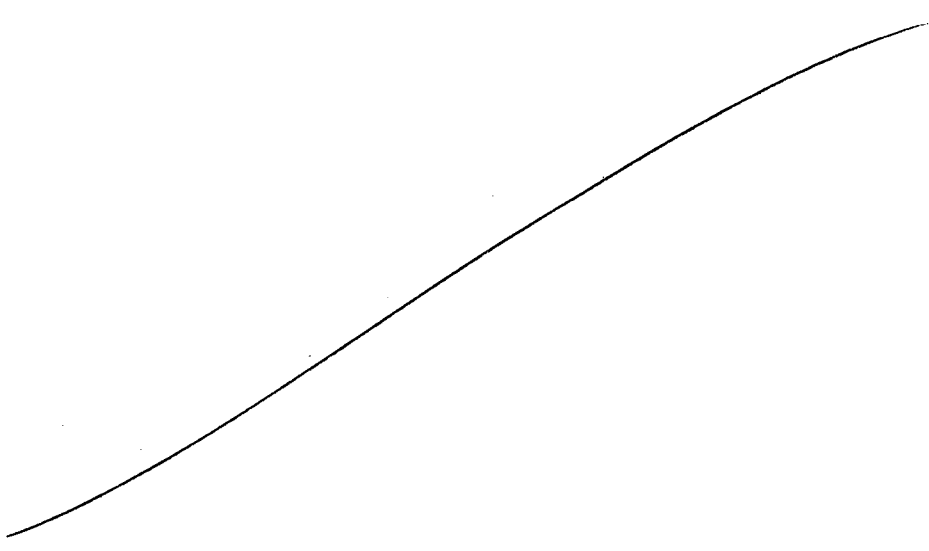
To.

The Dewan of Mysore.

The Application of Hall Research Corporation, a Delaware Corporation, of Woolworth Building, New York, City, United States of America, Manufacturers, for leave to file a specification under Part 1 of The Inventions and Designs Regulation, 1894.

1. The applicants are in possession of an invention for "Improvements in and relating to Translating Sound Variations"; they are the assigns of Ray Edwin Hall the inventor thereof; and to the best of their information and belief, the invention is new within the meaning of Part 1 of The Inventions and Designs Regulation 1894; and no circumstance exists which, if the applicants be authorized to file a Specification and file it in accordance with that Part will disentitle them to an Exclusive Privilege thereunder in respect of the invention. An Application for a patent was filed in British India on 10th March 1920, No. 5401 ; see Gazette of India, Part II, Page 500 dated 20th March 1920.

2. The following is a description of the invention :-



The present invention concerns novel methods and means for translating energy variations, particularly feeble or high frequency variations including electrical variations, aperiodic or periodic, alternating or pulsating; and acoustic variations whether as waves in air, gas, liquid or solid, or as vibratory movements of mechanical elements, elastic or forced.

While certain features of the invention may be usefully employed for translating aperiodic variations, many of its most important features concern translation of periodic variations of definite frequency, particularly where the frequency is too high or the amount of energy too small for translation and production of sensible indications or effects by ordinary means.

For instance, the apparatus and methods herein shown were primarily devised and intended for the purpose of utilizing the extremely feeble electrical currents and sounds available in the receiver telephone of present day long distance wireless telegraph apparatus, so as to cause and control manifestation thereof with any required degree of power.

The particular result achieved in apparatus herein disclosed is the recording on ordinary ticker tape of wireless messages where the received energy is so small as to be barely audible or indeed where it is inaudible in the ordinary wireless receiver telephone. An important but subsidiary result is the elimination of errors due to static discharges of atmosphere into the wireless receiving apparatus.

The invention involves the use of a sound-sensitive jet, having some of the characteristics of the well-known "singing" or "sensitive" flames of the physics books, and there are certain of the improvements devised for the jet

which are applicable to sensitive flames and other sensitive jets of all kinds.

As the particular jet which it is preferred to use is a cooling jet of gaseous fluid, preferably air, many complications due to the heat of combustion are eliminated and more important still, it is possible to utilize a new and far more efficient method of translating and utilizing the characteristic changes in shape or dimensions of the jet which are precipitated by the transmitted sound waves or the other vibrations to which the jet is sensitive. This method consists broadly in causing the change of shape of the jet to have a cooling effect on a heat sensitive element, normally heated to high temperature by means independent of the jet. In this way the advantage is obtained of an enormous temperature drop, the difference between the temperature of the normally heated sensitive element and the cooling jet being very great as contrasted with that available where a flaming jet is employed as the source of heat for intermittently heating above normal a normally cool sensitive element. In the latter case the heat is never actually withdrawn from the sensitive element but merely varies its intensity between a high limit much lower than ours and a low limit much higher than ours. Working as described with a cooling jet, it is possible to use the sensitive element, extremely fine wire, such as Wollaston wire, say .0002 - .0004 inch in diameter, and to heat it from the inside, to an accurately predetermined upper limit of safety, by means of an electric current flowing in the wire itself. Then, radiation losses being constant, enormous variations in temperature are attainable by the alternate application and withdrawal of the cooling blast from the jet.

The present invention may be more fully understood from the following description in connection with the accompany-

ing drawings, in which

Figures 1, 2 and 3 on sheet 1, show a complete recording set with all parts except wires and batteries.

Figure 1 is an elevation of the sensitive receiver set, the casing being shown in vertical section;

Figure 2 is a side elevation of a motor driven fan for supplying air to the same;

Figure 3 is a top plan view of the relay and recording set;

Figure 4 is a vertical section on the line 4-4, figure 1;

Figure 5 is a horizontal section on the line 5-5, figure 1;

Figure 6 is an elevational perspective detail of the heated sensitive element shown in figure 1;

Figure 7 is an elevation of the recorder view endwise of the tape;

Figure 8 is a side elevation of the relay;

Figure 9 is a diagram showing the wiring of the foregoing apparatus and also how it may be associated with a wireless telegraph receiving system;

Figures 10 to 14 inclusive are diagrams indicating possibilities of resonance of an air column resonator, figures 10, 11 and 12 as a stopped pipe at odd multiples of the same frequency and figures 13 and 14 as an open pipe at even multiples of the same frequency.

In the drawings all of the parts except the auxiliary fan blower, the relay and the recorder are secured to a plate 1 which may form the top of a protecting case 2. As shown, the edges of the plate 1 rest in a rabbet 3 in the top edge of case 2 and constitutes in effect the top of said case. The bottom is closed in by a plate 4 secured in a similar rabbet 5 in the bottom of the case by screw 6

engaging a frame 7 which is a part rigid with the top plate 1.

The frame piece 7 is rigid with an upright 8 at one end supporting an air column resonator 9 and a telephone receiver 10. At the other end of 7 is an upright 11 having at its upper end a horizontal extension 12 secured by sleeve 13 extending through the top 1 and secured by collar 14 and flange sleeve 15 bearing on opposite sides thereof.

The frame piece 7 has rigidly secured to the under side thereof, preferably by soldering, a substantial sheet metal support or platform 16 on the upper side of which are secured the silencer chambers 17, 18 and on the under side of which are secured the tubular connection 19 leading to chamber 17, 20 connecting 17 and 18 and 21 leading from chamber 18 to the jet producing means. The silencer chambers 17 and 18 which are of rectangular construction afford substantially structural solidity and are in fact utilized as support means for securing the frame piece 7 and all connected parts to the top 1, the particular means shown being U-shaped brackets 22, 22 secured by screws 23 adjacent the four corners of top 1.

The ampere meter 24 is inset in the top as shown in the drawings so that the face thereof is approximately flush therewith.

In the sleeve 13 which projects through top 1 is a vertically slidable tube 25 adapted to be locked in desired position of adjustment by screw 25^a.

The tube 25 serves as the adjustable support for the heat sensitive member 26 which in this case comprises a continuous length of extremely fine platinum wire wound as a coil upon parallel supports of which 27 are preferably connected in circuit with the respective adjacent leading-in wires 28-49. The other support or supports 29 are pref-

erably insulated from the fine wire 26 as also from each other and from supports 27.

For convenience the parallel supports are inserted in a non-conducting clamping plate 30 secured by screws 31 to another clamping plate 32 having a stud projection 33 removably fitting the lower end of tube 25 and secured therein by screw 34.

The lower end of the parallel supports 27, 29 are spaced apart by an insulating collar 35.

The lower face of 30 is provided with a central circular boss 36 of slight elevation which serves to radially deflect the air jet when it impinges thereon.

Beneath and in direct alignment with the axis of the heat sensitive coil 26 is arranged the jet producing means. As shown there is an outer tubular support 37 rigidly connected with frame member 7 as at 38. Into the lower end of this fits a similar tubular projection 39 rigid with plate 16 and communicating through it with air passage 21.

Into the upper end is fitted a slide nipple 40 which may be secured at a desired elevation by means of screw 44. The nipple is a cone terminating in a cylindrical projection 41. Interiorly it is formed with gradually converging walls 42 terminating in a straight cylindrical passage 43 for discharge of the jet.

On the front side of vertical support 8 is secured tubular resonator 9 extending adjacent jet 43 where it is provided with a nipple 45 converging to an orifice 46 which affords a cone frustrum outlet rather than a cylindrical passage outlet. Preferably the axis of the resonator and the horizontal diameter of the orifice 46 are on a level with the jet outlet so that the resonant air column takes effect through the orifice on a level slightly above and slightly below the jet outlet. The jet

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is thus in a position analogous to but not precisely the same as that of the lips overlapping the mouth of a bottle when attempting to make it whistle a harmonic rather than a fundamental note thereof. The principal difference is that the jet is preferably parallel with the orifice so that it does not impinge thereon but merely influences the air column through the orifice by induced draft produced by the jet.

The length of the resonant air column and the position of its orifice with reference to the jet may be adjusted by sliding the nipple 45 and securing it in desired position by means of screw 47. Preferably the air column orifice is about twice the cross section of the jet and may be about equal to the outside diameter of the jet nozzle as shown in figures 1 and 5.

The telephone receiver 10 may be of any standard make, either a commercially obtainable receiver of the type commonly used for wireless telegraph signals sounding at about 1000 per second or it may be especially designed for the 4000 frequency. In the latter case, the diaphragm may be selected to have a natural frequency of 4000, the same as the resonant air column and if desired, the coil may be specially designed for most efficient operation at the same frequency.

The ampere meter 24 may be of any desired construction. It is connected in series with a binding post through conductor 28 which is in series with sensitive wire 26, whence the circuit is through wire 49 to the other binding post.

The air for the jet may be supplied from any suitable source either of high pressure through reducing valves, or, as the latter are apt to be noisy, directly from the fan shown in figure 2. The fan motor 50 may be of any de-

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sired construction and motors have been used designed for operation on two storage cells, say 3 or 4 volts. Where available, an alternating current induction motor would be desirable because of the very uniform speed which it maintains.

The motor drives a centrifugal blower of any desired type in case 51 discharging through outlet 52. The radial blades within the case may be of elastic spring material such as brass, yielding under the air pressure, and somewhat inefficient on that account, but nevertheless adequate, and having the advantage of being silent, that is not setting up sound vibrations which might travel to the jet and disturb its action.

Though the ampere meter may be sufficient as a visual indicator of fluctuations corresponding to the received message and though an ordinary telephone in series therewith may be a sufficient audible indicator, it is preferable to use either in conjunction therewith or as a substitute therefor the receiver set shown in figure 3, the connections of which are shown in figure 9.

Referring to figure 3, the parts will be seen as mounted upon a single board 53 supplied with binding posts 61, 62, 63, 64, 65, 66, which are wired on the back side of the board to the apparatus as indicated in figure 9. The relay comprises the magnet with windings 67 operating on armature 68 retracted by spring 69 adjustable by rotary thumb-screw 70. The vibrations of the armature make and break the circuit of another source of power in the usual way. This circuit energizes the windings 71 to attract armature 72 retracted by spring 73 to laterally shift the guide 74 of tape 75 beneath the stylus 76 which may be nothing more than an old fashioned stylographic pen removably mounted in support 77. The tape roll 78 is suit-

ably supported on a reel stand 79 whence it passes under the stylographic point and over guide 74 to a continuously driven feed mechanism which consists of bearing down wheel 80 mounted in stand 81 opposite to feed wheel 82 on shaft 83 having bearing in support 84 as well as in standard 81, and having rigid therewith a friction disc 85 driven by friction stud 86 on shaft 87 of motor 88.

Any desired means for changing speeds of motor or strengths of the various electric currents or air pressures may be employed. A specific means for adjusting the air pressure without changing the speed of the blower motor is shown in figure 1 as consisting of an outlet hole 90 in the top of silence chamber 18, the extent of the pressure vented therethrough being controlled by leaf spring 91 which can be variably depressed by screw 92, non-positively held in adjusted position by friction spring 93. By screwing down on the screw the vent may be completely closed or by the reverse operation may be opened to any desired extent. The pressure of the blower being constant the amount of relief through vent 90 will determine how much of this pressure will be effective on the jet 43.

There are many ways in which the above apparatus may be connected up and operated, but one desirable way is diagrammatically indicated in figure 9. In this figure, the aerial A and the local oscillating circuit B are supposed to be tuned to and energized by received waves of 100000 frequency. A local oscillatory circuit C is supposed to be operatively associated therewith and with the audion D so that a heterodyne frequency of 40000 will be impressed upon telephone 10 and the resonator 9 may be tuned to the same frequency. The jet outlet 43 discharges in proximity to the contracted orifice 46 of resonator 9. The jet is directed along the axis of the

fine wire coil 26 which is connected in series with the battery B through adjustable resistance R. There is an ampere meter 24 which may be thrown in series or shunted by means of switch s_1 , a telephone transmitter T which may be shunted by switch s_1 and the relay 67 which may be shunted by switch s_2 . With this arrangement the ampere meter may be put in series to measure the flow of normal heating current through the coil 26 and the variations of such flow may be utilized as the visual indicator of the received message. The telephone T may be thrown in or out to serve as an audible indicator and the relay 67 in or out to operate the recorder. The connections of the relay and recorder are through 61, 62, 63, 64, 65 and 66 which represent the binding posts shown on the relay and recorder board of figure 3.

The recorder circuit controlled by the relay includes the battery B' connected to binding posts 65 and 66 which in turn are wired to serially connect the armature operated switch of the relay and the operating magnet of the recorder. The same battery energizes the motor for unreeling the tape through a parallel circuit across said binding posts 65, 66.

The jet when properly adjusted will be broken down by the air pulses caused by the diaphragm, taking effect through orifice 46 on the sensitive base of the jet at nozzle 43. This will happen regardless of any tuning provided the received energy be sufficiently powerful. Many degrees and kinds of tuning are possible.

The simplest structural expedient and at the same time the most acoustical complex method is to have the resonator 9 adjusted in length so that the air column therein will have an acoustic length approximately one-fourth the length in air of a wave of 1000 frequency so that when excited through the orifice as shown in figure 10, and operating as

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a stopped pipe by reason of the telephone diaphragm at the base thereof, its fundamental resonant frequency will be 1000. When so vibrating the stationary wave is conventionally indicated by the dotted lines showing a node at n and a vent at v. Such a resonator will be capable of resonating as a stopped pipe excited through the open end at frequencies which are an odd multiple of 1000, that is 3000 with nodes and vents as indicated in figure 11 or 5000 with nodes and vents as indicated in figure 12, or any higher odd multiples which are not illustrated but which are governed by the same law.

The same resonator when excited only by vibrations applied by the diaphragm at the other end thereof functions as an open pipe, resonating at the even multiples of 1000, that is, at 2000, with nodes and vents as indicated in figure 13 or 4000 with nodes and vents as indicated in figure 14.

A resonator having a diaphragm of sufficient stiffness so that it will resonate as a stopped pipe when excited from the open end by the air jet has remarkable advantages. A sympathetic effect of the jet when properly located and discharging at proper pressure will set up a faint but effective resonance in the tube at a 3000 frequency or, more desirably, a 5000 frequency. This internal resonance reacts on the jet and produces incipient vibration thereof at the 3000 or the 5000 frequency.

In this situation the 4000 frequency vibrations corresponding to the electrical heterodyne, being applied to the diaphragm at the base of the resonator the air waves originating at the base will set up resonance at the 4000 frequency indicated in figure 14.

In this situation the acoustical resultant or heterodyne which is the numerical difference between 4000 and

5000 is 1000. The normally continuous 5000 frequency waves reinforced by the 4000 frequency received wave trains will precipitate characteristic change of the jet 1000 per second. 1000 per second, however, is the fundamental of the resonator when excited from the open end and the breaks of the jet reacting on the resonator from the open end thereof will excite the 1000 frequency resonance indicated in figure 10 which in turn will stabilize the frequency of the breaks at 1000 thereby obviating or greatly lessening the effectiveness of irregular static discharges which might otherwise tend to break in upon the functioning of the jet.

Obviously, analogous less complicated effects requiring greater power will be produced if the resonator be excited by the diaphragm, at any of the frequencies indicated in figures 10 to 14 inclusive.

Similarly any stopped pipe of equivalent acoustic length adapted to be excited from the open end only will have the effect of tuning the jet to one or more of its natural frequencies according to which or how many of them are excited by the jet. This will of course depend upon the pressure and shape of the jet as well as upon its proximity, annular disposition and relative location, with respect to the base of the jet. An open pipe resonator may also be used for this purpose.

In referring to resonance at specified frequencies as for instance 1000, 4000, 5000, etc., it will be understood that in devices of this type the resonance effect can be produced by impulses through a considerable percentage range above or below the precise frequency named. The numbers selected are merely illustrative of numerical ratios suitable for producing an acoustic heterodyne of which the component frequencies are harmonics. Other fre-

quencies may be used however.

The apparatus being adequate for translating extremely feeble received variations into corresponding impulses of power sufficient to operate the recorder, either directly or through the relay, it is obvious that by relaying once or twice more any existing power circuit could be effectively controlled to operate motors of any power desired.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, we declare that what we claim is:-

1. The method of translating sound vibrations which consists in causing said vibrations to effect characteristic change of shape of a cooling jet of gaseous fluid and utilizing such change of shape to variably cool an electric conductor of small mass normally heated by flow of electrical energy therethrough to thereby cause corresponding changes in the resistance of the conductor and resulting variations in the flow of the current to produce a desired indication or effect, substantially as set forth.

2. In the method of translating sound vibrations as claimed in claim 1, causing the modified jet to cool an encircling fine wire conductor heated to high temperature by flow of electric current therethrough and permitting the conductor to reheat when the jet is restored to normal shape, substantially as set forth.

3. In the method of translating sound vibrations as claimed in claim 1, the application of air waves laterally at the base of the jet, substantially as set forth.

4. In the method of translating sound vibrations as claimed in claim 1, utilizing the changes of resistance and current flow to operate a relay or recorder, substantially as set forth.

5. In the method of translating sound vibrations as claimed in claim 1, adjusting the jet by varying its velocity or length, its associated sympathetic vibrations, or other resonance factors, according to the intensity of the indications in a quantitative indicator, substantially as set forth.

6. In the method of translating sound vibrations as claimed in claim 1, forming the jet of slightly compressed air rendered substantially noiseless by passage through large volume silencing chambers and through a delivery passage of relatively large cross-section, directing gradual convergence of the air toward the end of the delivery passage, and permitting escape of air through a passage of relatively small cross-section, substantially as set forth.

7. In the method of translating sound vibrations as claimed in claim 1, adjusting the length of the jet by interposing a radially dispersing deflector in the path thereof, substantially as set forth.

8. In the method of translating sound vibrations as claimed in claim 1, increasing the sensitiveness of the jet by applying an open mouth of an air column resonator laterally at the base of the jet in adjusted or predetermined relation to cause the jet to excite sympathetic vibrations of the air column resonator at one of its natural frequencies, substantially as set forth.

9. In the method of translating sound vibrations as claimed in claims 1 and 8, applying the mouth of the air column resonator partly above and partly below the level of the base of the jet, substantially as set forth.

10. In the method of translating sound vibrations as claimed in claim 1, establishing incipient vibration of the jet at a desired frequency by air waves projected laterally against the base thereof and then precipitating

the characteristic change of shape of the jet by projecting air waves of a slightly different frequency cooperating with the first mentioned waves to produce periodic beats of intensity sufficient to produce the desired change of shape, substantially as set forth.

11. In the method of translating sound vibrations as claimed in claim 1, producing a heterodyne from a transmitted current, utilizing the heterodyne to produce physical vibrations, producing a second heterodyne from the physical vibrations, and utilizing the second heterodyne to influence a sensitive jet, substantially as set forth.

12. In apparatus for practicing the method claimed above, a heat sensitive member in combination with a sensitive cooling jet adapted to have varied cooling effects on the member according to change of shape or dimensions induced in the jet, substantially as set forth.

13. In apparatus as claimed in claim 12, forming the heat sensitive element as an electric conductor of small mass, such as an extremely fine wire, substantially as set forth.

14. In apparatus as claimed in claims 12-13, a telephone receiver for applying air waves laterally at the base of the jet, substantially as set forth.

15. In apparatus as claimed in claims 12-14, the construction in which the telephone receiver is provided with an air column resonator, the open end of which is a contracted orifice and the remote end is stopped by the telephone diaphragm, substantially as set forth.

16. In apparatus as claimed in claims 12-15, the provision of means for exciting resonance of the air column resonator by energy variations of the same frequency, substantially as set forth.

17. In apparatus as claimed in claim 12, the arrangement in which the heat sensitive member surrounds the jet, substantially as set forth.

18. In apparatus as claimed in claim 12, arranging the heat sensitive member and the jet to be relatively adjustable in a line parallel to the axis of the jet, substantially as set forth.

19. In apparatus as claimed in claim 12, means for producing the sensitive jet comprising means for supplying gaseous fluid under pressure, a conduit therefrom terminating in a nozzle, large volume silencing chambers in the conduit and means for venting pressure therethrough to vary the effective pressure at the nozzle, in combination with the discharge nozzle, substantially as set forth.

20. In apparatus as claimed in claims 12 and 19, providing the discharge nozzle with conically converging walls and a cylindrical outlet passage leading therefrom, substantially as set forth.

21. In apparatus as claimed in claims 12-20, a receiver set comprising a plate, an ampere meter inset therein, a fine wire coil adjustably supported thereby, rectangular silencing chambers forming two sides of an enclosure, a plate secured to the bottom of the silencing chambers forming a bottom for said enclosure, means for supporting a jet nozzle in alignment with the axis of the coil, an air column resonator in operative relation to the nozzle, and a telephone receiver in operative relation to the base of the resonator, substantially as set forth.

22. In apparatus as claimed in claim 21, the provision of a frame or bracket arranged to support the coil, the jet, the resonator and the receiver in proper spaced relation, substantially as set forth.

23. Apparatus for practicing the method claimed above,

comprising means for producing a heterodyne consisting of means for impressing a local periodic current upon a transmitted periodic current, means for producing an acoustic heterodyne consisting of means for subjecting a sensitive jet to energy derived from the first heterodyne, and means for translating the resulting jet variations, comprising a telephone receiving instrument connected with means controlled by the sensitive jet, substantially as set forth.

24. The method of translating sound vibrations substantially as herein described with respect to the several figures of the accompanying drawings.

25. In apparatus for translating sound vibrations constructed and adapted to operate substantially as herein set forth with respect to the several figures of the accompanying drawings.

3. The applicants, therefore, apply for leave to file a Specification of the invention pursuant to Part 1 of the Mysore Inventions and Designs Regulation, 1894.

Dated this 22nd day of December 1919.

Hall Research Corporation
by Ray Edwin Hall
Pres.

1, Ray Edwin Hall, president of Hall Research Corporation, the applicant above named, do declare that what is stated in this Application is true to my knowledge, except as to matters stated on information and belief, and as to those matters, I believe them to be true.

Ray Edwin Hall

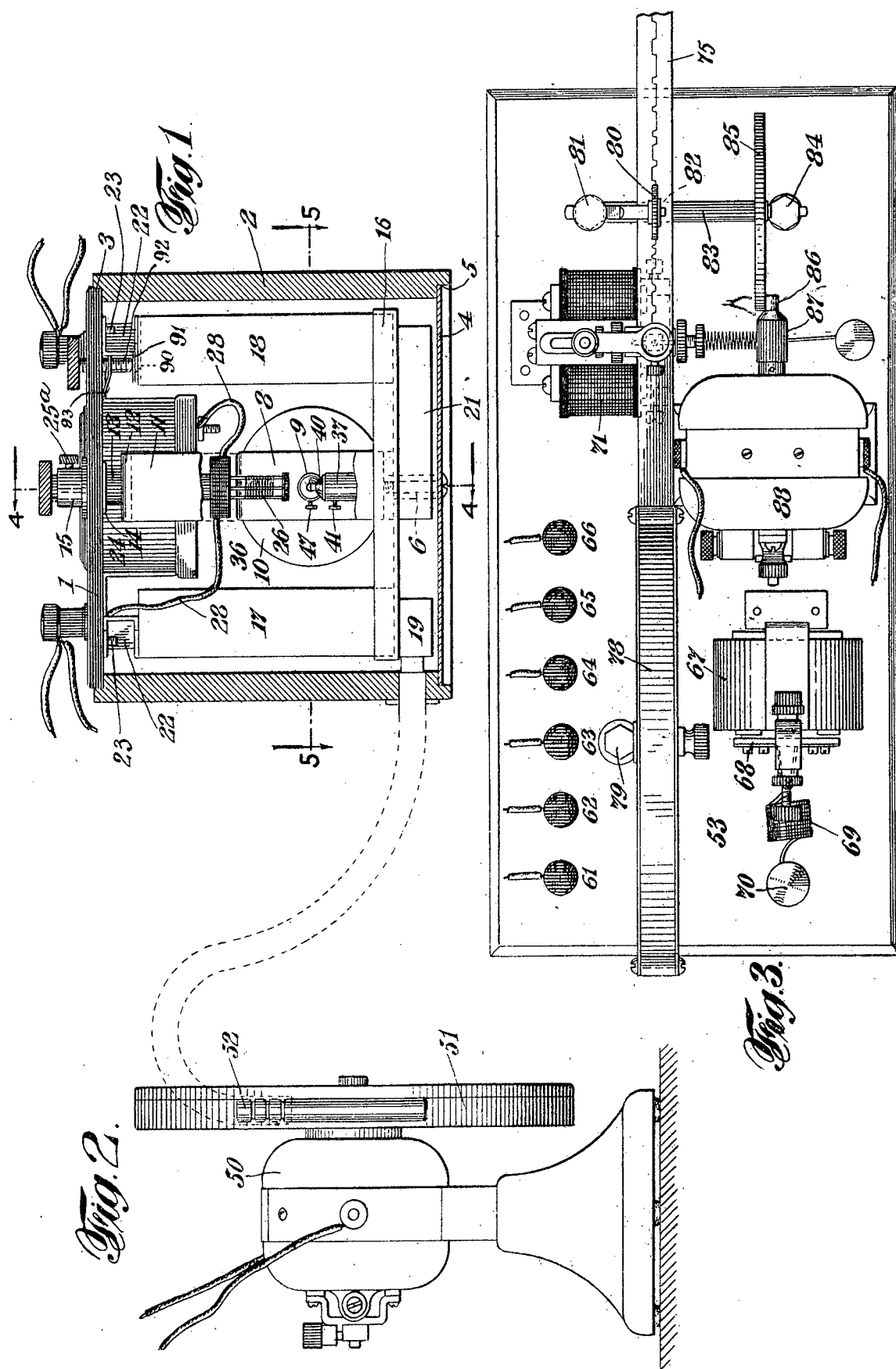


Fig. 4.

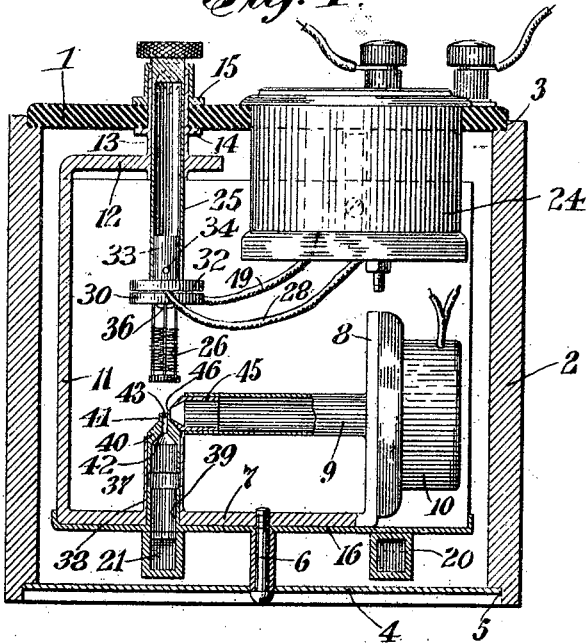


Fig. 5.

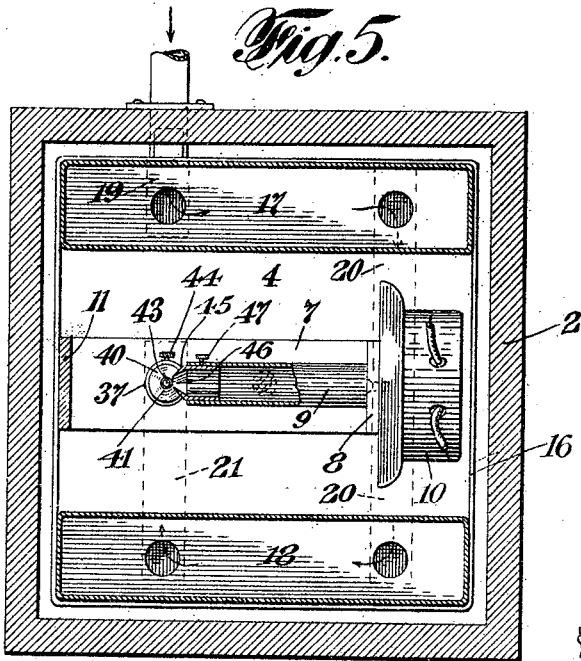


Fig. 6.

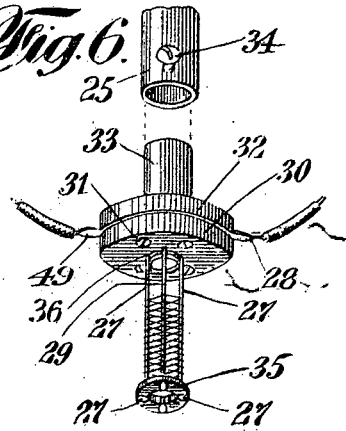


Fig. 7.

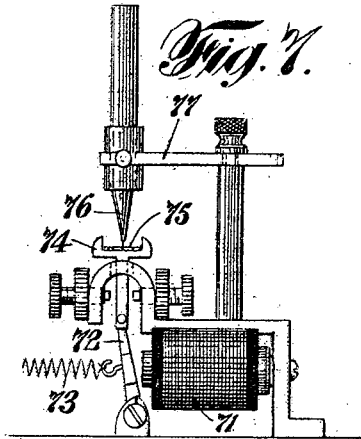
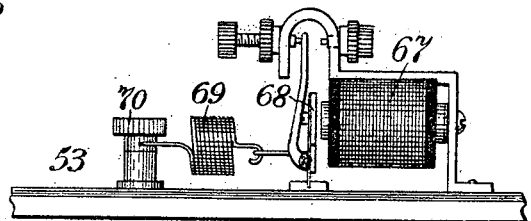
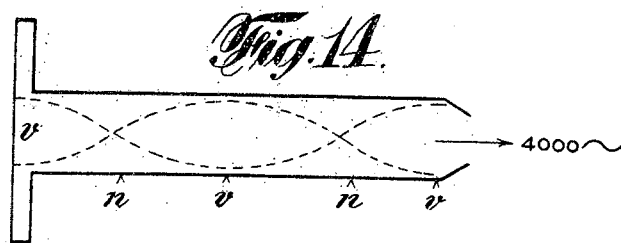
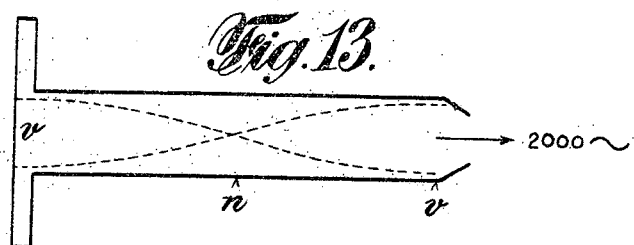
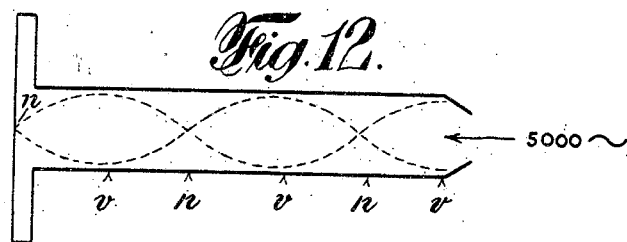
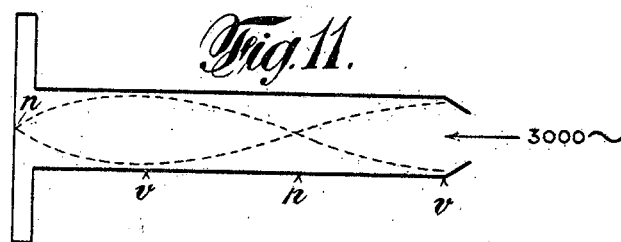
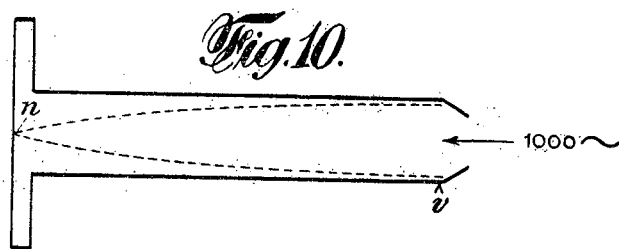
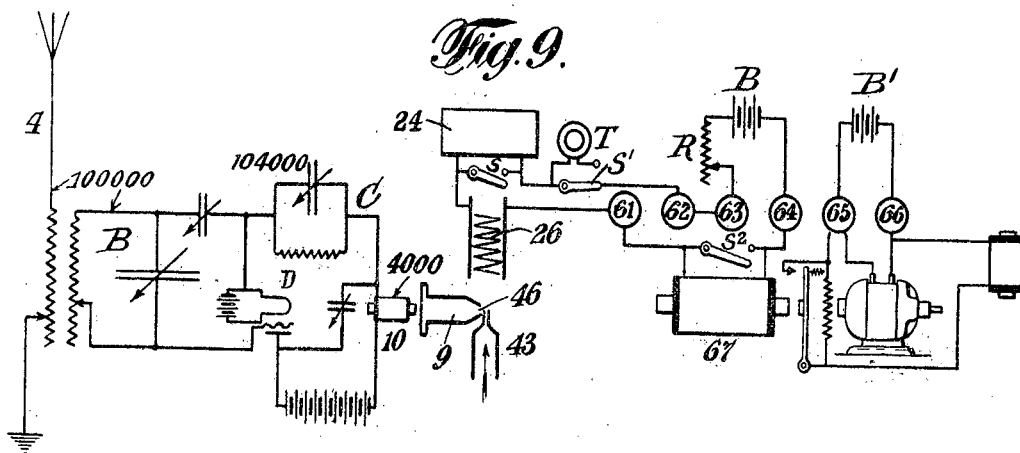
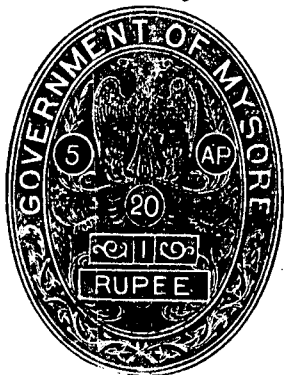


Fig. 8.







MYSORE

POWER OF ATTORNEY

In the Matter of The Inventions and Designs
Regulation XI of 1894, of the Government of
Mysore:

and

In the Matter of Hall Research Corporation,
a Delaware corporation, of Woolworth Build-
ing, New York City, United States of America

We, the above named Hall Research Corporation, do hereby
retain, constitute and appoint *Messrs. H. V. Williams & Co.,*
Patent Agents and Engineers, of 8 Esplanade
East, Calcutta, British India,
as our Agents and Attorneys, to apply for and obtain from the
Government of Mysore an Exclusive Privilege for Improvements in
and relating to Translating Sound Variations, and to maintain the
same in force; and we authorize *them* to sign our name to such
papers and writings and do such acts regarding the same, including
substitution and revocation, as may be necessary or expedient. And
lastly, we request that all notices, requisitions and communications
now or hereafter relating to the same may be sent to such Agents
at the above address, and that they be recognized as our authorized
agents in all proceedings incident thereto.

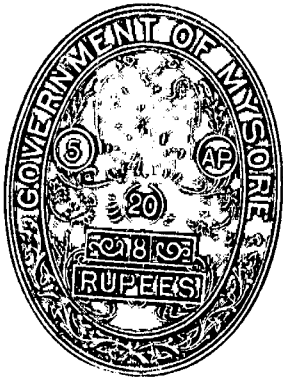
Dated this *12th* day of December 1919.

Signed, sealed and delivered
by the above named Hall Research
Corporation at New York City, in
presence of:-

Alfred R. Hawyer
41 Park Row - N.Y. City U.S.A.
Leonard Burrows. Clerk
41 Park Row - N.Y. City U.S.A.



9/8/1919



M.Y.S.O.R.E

A S S I G N M E N T

In consideration of the sum of Rs50-0-0 to me in hand paid, the receipt whereof is hereby acknowledged, I, Ray Edwin Hall, engineer, of Chicago, Cook County, Illinois, United States of America, hereby sell and assign to Hall Research Corporation, a Delaware corporation, of Woolworth Building, New York City, United States of America, the entire right, title and interest in and to my invention of Improvements in and relating to Translating Sound Variations, and I hereby authorize said Hall Research Corporation to apply for Letters Patent on said invention in Mysore in its own name.

In witness whereof I have hereunto set my hand, this 22nd day of December 1919.

Ray Edwin Hall

WITNESSES:-

Admission
Remuneration

30

NOTE.—The following certificate must be signed in all cases. If the Bill bears date within the 15th of the month, the word "current" may be changed to "last." The Treasury Officer shall refuse to encash a bill unless the proper certificate is signed.

COUPON. The remitter may write here any communication to the payee.

No. 19 to the Head

to the of my } For Hall Research Corp'n's Patent } Paid on 23.3.20.
Application our reference } 20 for Dickson
No 5151-C. } Remitter.

by me prior to the Head sore.

The 191 Signature and Office of Disbursing Officer.

am

ABSTRACT CONTINGENT BILL.

Note.—If this Bill is headed with any other month than that in which it is presented for payment, or if the certificate overleaf regarding submission of detailed Bills is not signed, the Treasury Officer must return it for correction for the requisite certificate.

Government of Mysore	Bill for Contingent Charges of	Month of
Head of Service		Voucher No.
Nos. of Sub-Vouchers	Description of Charge and date of authority (where special sanction is necessary)	Amount
		* Rs. a. p. Rs. a. p.

The total of this Bill must
be entered in both words and
figures

In words Rupees

* This column should, when charges are described, exhibit the component parts of the detailed head.
The total of each detailed head will be entered in the next column.

N. B.—The Treasury Officer will make payments on this form as often as required, but the drawer should be careful to include in the Detailed Contingent Bill of a month only the amount of all abstracts encashed at the Treasury during the month.

Dated

Received Contents.

The

191 .

Drawing Officer.

DRAFT.

SUBJECT.....

2 Draft (2.1)

Diary No. of letter replied to.....

GENERAL AND REVENUE SECRETARIAT,

, the.....191

Date of issue.....

Signed by.....

Section. *g.m.*
File No. *186-19*
Serial No. *2*
No. *g.2738 me*

To

*The Secretary to the Board for
Chemical and Industrial Research
and Scientific advice*

Has the honor to forward herewith

for report under Sec. 6, Cl. (2) of the

Mysore Inventions and Designs Regula-

tion, XI of 1894, an application for leave

to file a specification of an invention for

*"Improvements in and relating to sound transla-
ting sound variations" by Hall Research Corporation
of Woodworth Building, New York City, U.S.A.*

By Order,

dcg
27/3/20

For Chief Secretary to Government.

mya *uly 27/3/20*

DRAFT.

2 Drafts

SUBJECT.....

Diary No. of letter replied to.....

GENERAL AND REVENUE SECRETARIAT,

, the 191

Date of issue.....

Signed by.....

Section. *g.m.*File No. *186-19*Serial No. *3.**22739 (Encl 2 & 15-9)*

To

*The Superintendent of
Stamps.*

Has the honor to forward herewith a
 Power of Attorney executed by *Hall Research*
Corporation of 230 Worth Building, New York City, U.S.A.
 constituting Messrs. *H. V. Williams & Co., Calcutta*
 as Agents in respect of ~~his~~ ^{their} invention
 for *"Improvements in and relating to translating
 sound variations"* and also a *Deed of Assignment*
in favour of the Applicant Corporation by Mr. Ray Schurin Hall of U.S.A.
 and to request that the same may be im-
 pressed with the Mysore General Stamp
 of the value of Rupee One, ^{and Rupees Eight respectively} also herewith
 forwarded, and the Power ^{and the Deed} returned to
 this office.

By Order,

22/2/20.
 For Chief Secretary to Government.

M.A.

27/2/20

J.M. 186-17-H

327

Duplicate.

(To be returned to the General and Revenue Secretariat for being placed in the file.)

1. No. 241...
2. Date of Remittance, March 19 20
3. From whom received, Messrs. H. V. Williams & Co., Calcutta
4. Date of receipt of amount in the General and Revenue Secretariat, 23.3.20
5. On what account, Appl. Fee for Invoice 30419-20 by Hall Reel and Corp. Machine Co.
6. Amount (in figures and words), Rs. 10/-
Rs. fees Item only.
7. The head to which it should be credited.

(To be filled in by the Treasury.)

De. Subbarajappa
For Chief Secretary to Government,
General Department.

The above amount has been duly received and credited in the Treasury on this date.

Date 29.3.20

+ H. V. Williams & Co.
Hd. Acctt. W. Williams Treasurer. Try. Officer.

N. B.—Both the counterfoil and the duplicate to be returned to the General and Revenue Secretariat duly signed by the Treasury Department.

DIARY NO. 17322
(314)

WD A 0994-GPB-100-6-9-17

Stamp 38]

No. 373
Enc. 2

OFFICE OF THE SUPERINTENDENT OF STAMPS IN MYSORE.

Bangalore, Dated 5th April 1920

27025

FROM

M. Srinivasamurti Esq.,

Superintendent of Stamps in Mysore.

To

C. S. Balasubramanyam Esq., B. A.,
Chief Secretary to the Govt.
of Mysore, Bangalore.

I have the honor to forward
herewith the Power of Attorney and the
Deed of Assignment received with
your No. G. 22739 dated 3rd April
1920 and to request the favor of an
acknowledgment.

I have the honor to be,
Sir,
Your most obedient servant,
M. Srinivasamurti

Superintendent of Stamps
in Mysore

SECRET
IV
MINOR Depts:
7 APR 1920

10/4

draft. 35

★ SUBJECT.....

Diary No. of letter replied to.....17322.

Section *ly. m.*File No. *186-15*Serial No. *6*

GENERAL AND REVENUE SECRETARIAT

, the

191 .

No.

*G 23 644*Date of issue.....*14/4*

To

*The Superintendent of stamps
in Mysore.*

+ Signed by.....

M. B. S.

Sir,

*I am directed to acknowledge
the receipt of the Power of Attorney and
the deed of Assignment duly stamped
and forwarded with your letter no.
373 dated 5th April 1920.*

I have etc.

*For Chief Secy. to Govt.
10/4/20
over.*

*M. B. S.
10.4.20.*

265

Board for Chemical and Industrial Research
and Scientific Advice.

Bangalore, Dated... 6th May.....1920.

ch Secy all
5 MAY 1920 No. 163
Encl. 1.

19132
...Y NO.....

3.233 FROM

S. G. SASTRY, ESQ., B.A., M.Sc., F.C.S.,

SECRETARY, BOARD FOR CHEMICAL AND INDUSTRIAL RESEARCH
AND SCIENTIFIC ADVICE, BANGALORE.

C.S. BALASUNDARAM IYER, Esq., B.A.,

Chief Secretary to the Government of

H.H. the Maharaja of Mysore, Bangalore.

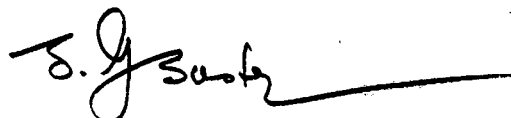
Refce:- G.22738/GM. 136-19-2 dated 3rd
April 1920.

With reference to the above, I am directed to state that leave may be granted, to file the Specification of an invention for "Improvements in and relating to translating Sound Variations" by Hall Research Corporation of Woolworth Buidling, New York City, United States of America.

I have the honour to be,

Sir,

Your most obedient servant,


Secretary.

G.M. 186-19-8
19/5

2 draft
37

G. R. S. VI—s.-v/21]

26800

Government of Mysore.
GENERAL DEPARTMENT.

Register No. 30 of 1919-20.

Bangalore, the 29/5/1920.

WHEREAS an application, dated the 20th March 1920 and received on the 23rd March 1920, has been submitted under Section 5 of the Mysore Inventions and Designs Regulation, 1894, by Hall Research Corporation, a Delaware Corporation, of Woodworth Building, New York City, U.S.A. (hereinafter referred to as "the applicant") for leave to file a specification of an invention for "Improvements in and relating to translating sound variations"

And whereas the applicant has duly complied with all the requirements of Section 5 of the said Regulation;

The Government of Mysore are pleased, under Section 6 of the said Regulation, to authorize the applicant to file a specification of the said invention in accordance with the provisions of the said Regulation.

ORDERED, that the applicant be, and he is hereby, informed accordingly.

By Order of the Government of Mysore,

16/5/20

For Chief Secretary to the Govt. of Mysore,
General Department.
14/5/20

Certified that the fees prescribed in the fourth schedule to the Mysore Inventions and Designs Regulation, 1894, in respect of the application for leave to file the said specification and of the filing thereof have been paid by the applicant, and that the specification hereinbefore described has been duly filed in accordance with the provisions of Section 8 of the said Regulation on this the eighth day of July 1920.

For Chief Secretary to the Govt. of Mysore,
General Department.

14/7/20

19/5

(Section 8 of the Inventions and Designs Regulation, 1894.)

8. (1) If within six months from the date of an order under Section 6, Sub-Section (1), or within such further time, not exceeding three months, as the Government of Mysore, in its discretion, may, on cause shown to its satisfaction and on payment of the fee prescribed in that behalf in the fourth schedule, see fit to allow, the applicant causes a specification of his invention to be filed in manner by this Part required, and the fee prescribed in the fourth schedule in respect of the filing of the specification to be paid, the applicant shall, subject to the other provisions of this Part, be entitled to the exclusive privilege of making, selling and using the invention in the Territories of Mysore, and of authorizing others so to do, for a term of fourteen years from the date of the filing of the specification.

(2) But an exclusive privilege in respect of an invention of a new manufacture shall, notwithstanding anything in Sub-Section (1), cease, if the inventor fails to pay, within the time limited in that behalf by the fourth schedule, any fee prescribed in that schedule in respect of the continuance of the privilege.

(3) If, nevertheless, in any case, by accident, mistake, or inadvertence, an inventor fails to pay any such fee within the time so limited, he may apply to the Government of Mysore for an enlargement of the time for making the payment.

(4) Thereupon the Government of Mysore may enlarge the time accordingly, on payment of the fee prescribed in that behalf in the fourth schedule, and subject to the following conditions, namely :—

- (a) the time for making a payment shall not in any case be enlarged for more than three months ; and
- (b) if any suit is instituted in respect of an infringement of the exclusive privilege committed after a failure to make a payment within the time limited for the making thereof and before the enlargement of that time, the Court disposing of the suit may, if it thinks fit, refuse to award or give any damages in respect of the infringement.

DRAFT.

2d copy
249

SUBJECT.....

Diary No. of letter replied to....16416

GENERAL AND REVENUE SECRETARIAT,

, the.....191 .

Date of issue.....29/5

Signed by.....*h. sec*Section. *G.M.*

File No. 186-19

Serial No. 9

No. *526801* *me*

To

*Messrs H. V. Williams & Co.,
Patent Agents & Engineers,
8, Esplanade East, Calcutta*

GENTLEMEN,

With reference to your letter No. *5157-c*
dated the *20th* March 1920,

I am directed to forward herewith G. O.

No. *G. 26800* dated the *29/5*191, authorizing *Hall Research Corporation,
a Delaware Corporation, of Woodworth
Building, New York City, U.S.A.,*

to file a specification of an invention for

*"Improvements in and relating to
translating sound
variations"*and to request that the fact may be com-
municated to the party concerned.~~I have, etc.~~

Yours faithfully,

Secy
14/5/20

For Chief Secretary to Government.

120
*14.5.20**14/5/20**Recd*
*16.5.20**Ky*
19/5

By registered post
9/7
From

H. V. Williams & Co.

Patent Agents & Engineers

8, Esplanade East, Calcutta.

474
CHIEF SECRETARIAT.
IV
MINOR Depts.
-8 JUL 1920
m RBL

G. M. 186-19-10

To

C. S. Balasundaram Iyer, Esq., B. A.,

Chief Secretary to the Government of

His Highness the Maharaja of Mysore,

General & Revenue Secretariat,

Bangalore.

Dated, the 5th. July 1920

Sir,

With reference to your letter No.G26801, G. M. 186-19-9 dated the 29th. May 1920, we have the honour to forward, under registered Book-post cover, the Specification (and three copies) of the Hall Research Corporation's invention for "Improvements in and relating to translating sound variations", together with the Government Order No.G26800 G. M. 186-19-8 authorizing the filing of the same.

The prescribed fee of Rs.30/- is being remitted by postal Money Order.

We have the honour to be,

Sir,

Your most obedient Servants,

H. V. Williams & Co.

REGISTERED

41

COUPON. The remitter may write here any communication to the payee.
No. 30
Prescribed: See - see over } H.V. Williams & Co.
letter No 5151-C, dated the }
5th. July 1920.

Remitted 8/2/20
to Mr Pomery.

CHIEF

MINOR Dept.

18 JUL 1920

in Rd

GOVERNMENT OF HIS HIGHNESS THE MAHARAJA OF MYSORE.

GENERAL AND REVENUE SECRETARIAT.

No.

Dated Bangalore, ... 191 .

From

D. M. NARASINGA RAO, Esq., B.A., B.L.,

Secretary to the Government of His Highness the Maharaja of Mysore,

General Department.

To

SIR,

Handwritten: 186-19-18
Duplicate.

(To be returned to the General and Revenue Secretariat for being placed in the file.)

1. No. 269
2. Date of Remittance 20 July 1920
3. From whom received Mem H. V. Williams and Co. Calcutta
4. Date of receipt of amount in the General and Revenue Secretariat 8th July 1920
5. On what account Interest for Govt no 30 of 1914 by Kalki Reservoir Corporation of Calcutta
6. Amount (in figures and words) Rs 30/-
Rupees thirty only
7. The head to which it should be credited.

(To be filled in by the Treasury.)

Handwritten: Desai Bhairayappa
For Chief Secretary to Government,
General Department.

The above amount has been duly received and credited in the Treasury on this date.

Date 20-7-20

Hd. Acctt.

Treasurer.

Try. Officer.

N. B.—Both the counterfoil and the duplicate to be returned to the General and Revenue Secretariat duly signed by the Treasury Department.

30005 2 copies
S.M. 186-19-12 475

GOVERNMENT OF HIS HIGHNESS THE MAHARAJA OF MYSORE,
GENERAL AND REVENUE SECRETARIAT

Bangalore, Dated

19/7/1920

No.

91315

NOTIFICATION.

(PATENT)

The following specification of an invention has been filed in accordance with Sections 8, 9, 10 and 11 of Regulation XI of 1894 (The inventions and Designs Regulations) and is open to inspection at the Mysore Government Secretariat on application to the Chief Secretary to the Government of His Highness the Maharaja of Mysore, and on payment of a fee of one Rupee.

By Hall Research Corporation a Delaware
Corporation of Woolworth Building, New York
City, United States of America.

" Improvements in and relating to
translating sound variations."

By Order,

DCS

For Chief Secretary to Government.

By 12/7/20

To

The Compiler, Mysore Gazette, for publication.

3 drafts
DRAFT.

44

SUBJECT.....

No.

Diary No. of letter replied to.....474

Section. g.m
File No. 186-19
Serial No. 12

GENERAL AND REVENUE SECRETARIAT

()
, the.....191 .

To

91316(2)

Meris H.V. Williams Esq
Patent & Trade mark Attorney

Date of issue.....19/7.....8 (Esplanade E.) Calcutta.

Signed by.....M. B. Sir,

With reference to your letter dated

5th July 1920. I am directed to for-

ward copy of a Notification No. 91316

dated.....19/7/20.....

issued by this Government in regard to
the invention filed by you under Regula-
tion XI of 1894 (The Inventions and
Designs Regulations.)

The order granting permission to file
specification is herewith returned, with
the certificate at foot, duly filled in and
signed.

I have, etc.,

Dec
12/7/20

for chuf Secretary to Government.

Q 12/7/20

3 drafts

SUBJECT.....

Diary No. of letter replied to... 474

Section 4. m

File No. 186-17

Serial No. 181

GENERAL AND REVENUE SECRETARIAT

()
the 191

No. 81317-19
auto each

Date of issue... 19/7

To

The Director of Industries and Commerce.

Signed by... M. B. S.

A Secretary to the Board for Chemical
and Industrial Research and Scientific Advice
a Chief Engineer.

Has the honor to forward herewith
for record in his office a copy of a
specification of an invention for
'Improvements in and relating to transmitting
sound variations' by Hall Research
Corporation, a Delaware Corporation
of Woolworth Building, New York City
B.T. over.